COLONY OF SINGAPORE

ANNUAL REPORT OF THE BOTANIC GARDENS DEPARTMENT FOR 1953

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BY

M. R. HENDERSON
Director, Botanic Gardens
Singapore

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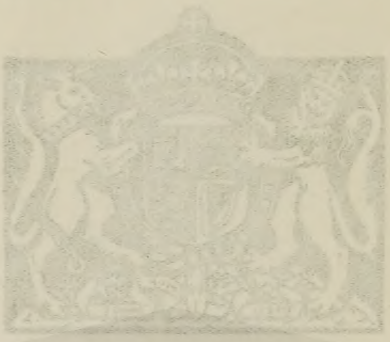

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STAFF

Mr. M. R. Henderson, Director, Mr. J. Sinclair, Curator of the Herbarium and Mr. G. H. Addison, Curator, Parks, were on duty throughout the year. Mr. J. W. Ewart, Curator, Gardens, was on leave until July and on his return resumed part time duty as Agricultural Officer, Singapore. Dr. C. X. Furtado, who retired from the post of Assistant Botanist in 1952, was re-employed in the same capacity. Mohamed Nur bin Mohamed Ghose, Herbarium Assistant, retired after forty years' service and was re-employed in the same post. The post of Assistant Director still remains vacant.

The average number of labourers employed in the Gardens was seventy-nine and at Government House Domain fifty-seven.

BOTANICAL WORK AND THE HERBARIUM

More field work was possible in 1953 compared with the previous year and more collections were made.

Mr. Sinclair made four short visits to Gunong Pulai in South Johore, which is now accessible to the summit by a jeep road. Transport and escorts were kindly provided by the O.C.P.D., Kulai. Collecting was done mainly in the ravines of the Sungai Ayer Hitam Besar and Sungai Ayer Hitam Kechil, and one trip was made to the summit. Here *Rhododendron longiflorum* was observed in full bloom. This is an epiphytic Rhododendron which is often found high up on tall trees. Unfortunately little flowering of the shrubs or of the taller trees was observed on any of the visits.

Mr. Sinclair spent three weeks during July in Trengganu, collecting along the coast and at Dungun and Bukit Besi. Some 186 numbers were obtained, the most interesting material coming from the lowland forest at Sri Bangun near Bukit Besi and from the Trengganu-Besut road. Preliminary examination shows that about 22 per cent of the plants collected have not previously been recorded from Trengganu and that about 14 per cent are new to science, but as this large area has not been intensively collected, these results are not surprising. Mr. J. S. Addison, Mr. C. L. Carrier and Inche Ibrahim bin Abdul Kadir of the Forest Department very kindly helped in providing transport during this expedition.

In November Mr. Sinclair spent eighteen days at the Forest Research Institute, Kepong, from whence visits were made to various places of botanical interest in the vicinity. Collecting was done at Weld Hill, a small Forest Reserve in the heart of Kuala Lumpur, which is the type locality for many Malayan plants; on the limestone at Batu Caves; on the quartz of Klang Gates; in the peat swamp forest at Telok, Klang; and in the lowland forest at Sungai Menyala, Port Dickson. In this last locality the Forest Department has set aside blocks of forest which are protected from exploitation and in which most of the trees have been identified and labelled, so that individual trees may be studied over long periods of time. Thanks are due to Mr. A. V. Thomas for permission to use the facilities of the Library and Herbarium of the Forest Research Institute, and to Mr. J. Wyatt-Smith for help in field work.

Mr. Sinclair continued his collecting of Singapore plants, with the result that several rare plants were found, at least six of which are new to the Singapore flora. These include Cymodocea, a marine flowering plant, which was found at Tanah Merah Besar.

Dr. C. X. Furtado continued his studies of the climbing palms of the genus Calamus, which are of considerable economic interest in that they provide rattan of commerce.

Mr. Henderson began preliminary work on a revision of the Mahogany Family (Meliaceæ) in Malaya. This is a large family of shrubs and trees of lowland and hill forest. Much material has accumulated since the last account of it in Ridley's *Flora* in 1922, and it is evident that a considerable number of new species will have to be described.

Mr. Sinclair completed his account of Annonaceæ in Malaya and the manuscript was almost ready at the end of the year to be sent to the printer for publication in the *Gardens' Bulletin.* He began work on the Nutmeg Family (Myristicaceæ) of Malaya, another large family of forest trees which requires revision.

The number of duplicates received by the Herbarium in exchange was 1901, less than in 1952, but the material was of good quality and very valuable. It came from the Forest Department, North Borneo; the Forest Department, Lae, New Guinea; the Forest Research Institute, Dehra Dun, India; the National Museum, Manila; and the Herbarium Bogoriense, Indonesia. Very few duplicates could be sent out during the year but a very large number has been prepared for distribution in 1954. 2,563 sheets were sent on loan, mostly to botanists working on Flora Malesiana. 1,636 sheets were mounted and incorporated in the Herbarium. The mounters were kept busy on a programme of re-poisoning mounted sheets.

Visitors working in the Herbarium at various times during the year were:—Mrs. B. E. G. Molesworth-Allen (Ferns of Malaya); Mr. Gordon de Wolfe, an American student at the University of Malaya, studying local ferns and orchids; Mr. Trivedi of India, studying ferns; and Mr. J. Wyatt-Smith, Forest Botanist, Malaya.

PUBLICATIONS

The most important departmental publication during the year, and, indeed, the most important one yet published, was *Orchids of Malaya* by Professor R. E. Holttum, the first volume of a proposed revised *Flora of Malaya.* This was issued as a fully bound volume complete with dust cover in colour, of 753 pages and many illustrations. By a generous donation the Singapore Gardening Society made it possible to include four full page colour illustrations of orchids. Apart from the blocks for these illustrations the entire volume was produced by the Government Printing Office, Singapore, who are to be congratulated on the excellence of the technical details of printing, binding, etc. The second volume of the Flora will be *Ferns of Malaya,* also written by Professor Holttum. The setting and preliminary proof reading of this volume was completed by the end of the year.

Volume 14, part I of the *Gardens' Bulletin, Singapore,* was published in August. This issue contains articles by several authors on various aspects of Malayan botany. Several new species are described and a number of new records are given for the flora of Singapore. An interesting and unusual article by Mr. I. H. Burkill, at one time Director of the Botanical Gardens, deals with vegetables eaten with their rice by Malays in Perak, revealing that more than 100 different kinds were used. The most important paper in this issue was one by Dr. C. X. Furtado on the genus Dæmonorops in Malaya. This is a group of climbing palms or rattans of great complexity and difficulty from the botanical point of view. Dr. Furtado provides full descriptions and illustrations of 32 species, of which 4 are described as new.

Descriptions and illustrations of new orchid hybrids raised in Singapore were published in the *International Orchid Journal,* U.S.A., by Messrs. Addison and Henderson.

An illustrated article describing suitable ornamental and shade trees for Malaya, with additional notes on Palms and Hedges, in which methods of planting, manuring and pruning were given, was published in the *Malayan Forester* by Messrs. Addison and Henderson. This was later issued by the *Malayan Forester* as a separate pamphlet for sale to the public.

HORTICULTURAL WORK

The bulk of the work done in any one year is made up of numerous small items such as routine planting and replanting, manuring, small improvements, etc., which need not be detailed. Only the larger items, on which a considerable amount of time and labour were expended, or those which alter the appearance of parts of the Gardens are mentioned here.

One considerable undertaking was the removal of the Chinese gardener's benches and potting shed from the old site on Lawn Z to a new one in the Nursery. This was done to reduce the labour previously required in handling pots and in pumping water. Close access to the benches by lorry is now possible and the water tanks are fed by gravity from a spring at the head of the Nursery. A new potting shed and a roof under which burnt earth can be prepared were built on the new site.

The small plant house, which previously had a slatted wooden roof partly covered by creepers, was re-roofed with corrugated aluminium sheet and Perspex. This was done to allow the display of a more varied collection of plants, including succulents, which require as much sunlight as possible and complete protection from rain. The work was done by the Gardens staff and included the removal of a large clump of Sealing Wax Palm in the centre of the house, the resurfacing of the benches and the clearing away of undergrowth and some trees round the house to admit more light.

A representative collection of small succulents, some planted out in a miniature rockery, some in pots, was arranged along the sunniest side of this house and have done well here. As many hybrid orchids as possible are displayed, as well as collections of foliage plants, ferns, begonias, etc.

The Lake was cleaned and weeded during the early part of the year. Large quantities of the Sacred Lotus (*Nelumbium speciosum*) and the water fern *Salvinia auriculata,* mentioned in the 1952 Report, were removed, as well as the usual weeds. All this material is composted.

A considerable amount of clearing was done along the boundary from Office Gate to the large planthouse and also along the side of the planthouse. This area had gradually become overgrown with unwanted seedling trees and shrubs. One result of this work was to show to better advantage a fine specimen of *Kurrimia paniculata,* a native Malayan tree which when it flowers is covered with innumerable spikes of tiny white flowers. Another result was the opening up of the side of the planthouse, where further improvements in layout are planned.

The avenue of Royal Palms along Office Gate Road, the first section of which was planted in 1950, was continued down to Cluny Gate. The young plants have all made good and even growth. The older ones, planted in February 1950, are now approximately 32 feet tall.

Towards the end of the year a programme of alterations to the Bougainvillea collections, behind the Canna beds on Lawn B, was begun. This was

undertaken in order to provide space for new kinds and to improve the appearance of the larger specimens, many of which had grown too large or had developed untidy and straggly growth.

Various gravelled paths in several parts of the Gardens were turfed over in order to save labour in keeping the edges neat and the paths themselves weeded and because of the difficulty of obtaining laterite gravel for re-surfacing such paths. The Public Works Department repaired and resurfaced a number of the main roads.

NEW ACQUISITIONS AND PLANTINGS

A valuable acquisition was a plant of *Mussænda philippica* var. *auroræ* sent by Mr. H. G. Keith of Manila to Mr. E. F. Allen of the Department of Agriculture. Mr. Allen kindly allowed the Gardens to keep this plant in order that it might be propagated. It is known in the Philippines as 'Dona Aurora', and, unlike other Mussændas, in which usually only one calyx lobe in each inflorescence is enlarged, it has all the calyx lobes in all the flowers enlarged into creamy white, leaflike structures. Even young plants are free-flowering and Dona Aurora should in the near future be a noteworthy addition to Malayan garden plants.

We are indebted to Mr. Allen also for a number of living plants of native orchids, including one of the Jewel Orchids (*Macodes petola*), which has very beautiful deep velvety green leaves with golden veins.

Eighteen plants new to the Gardens were put out during the year.

PLANTS INWARDS AND OUTWARDS

15,117 plants and 2,787 orchids were sold. Revenue from these sales was $17,528, of which $11,072 came from the sale of orchids. 3,519 plants, 23 orchids and 664 packets of seeds were sent out in exchange or as gifts and 132 plants (including orchids) and 445 packets of seeds were received. The small number of plants received, in comparison with the much larger number sent out, reflects the exchange of several valuable orchids against a much larger number of commoner and less valuable plants.

A limited number of surplus succulents was made available for sale to the public. Local interest in these plants is increasing.

ORCHIDS

Although few new orchid hybrids were flowered during the year, the number of promising seedlings increased considerably. Two new houses were built to accommodate them. These houses are of a simple pattern, being merely a corrugated aluminium roof with Perspex lights on a light wooden framework. Under the benches are watertanks or turf. Such a house is cool, humid and airy, and is very suitable for seedlings and young plants to about 4 inch pot size.

By the end of the year 538 new crosses had been made and there were over 2,000 flasks of seedlings in the laboratory.

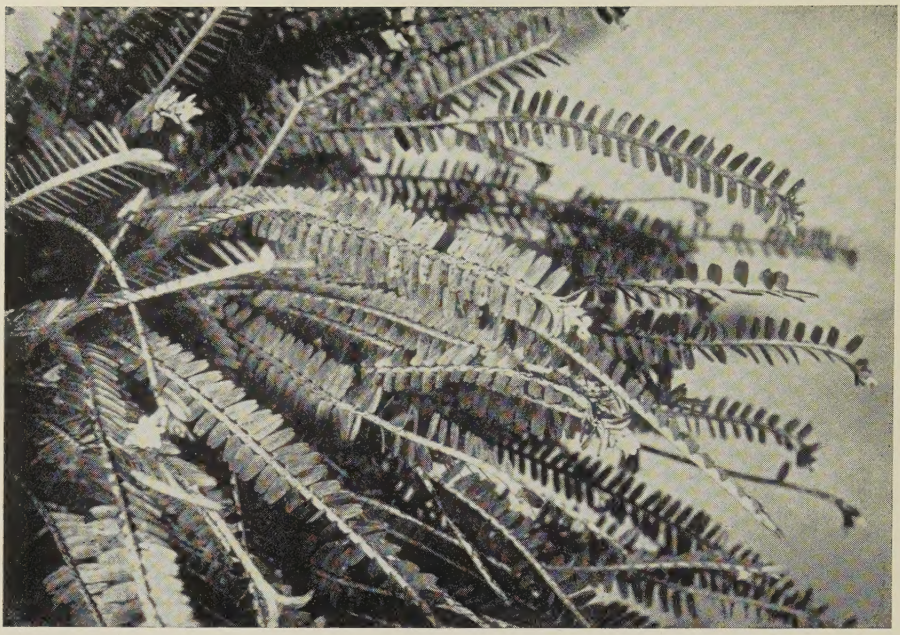
Until recently Vacin's formula, which is a mixture of inorganic salts and sugar in *agar-agar* has been used in the flasks. Experiments were begun by Mr. J. L. Pestana using organic substances such as urine and extract of fish in place of the inorganic salts, using as controls seedlings in Vacin's formula. The difference in rate of growth between the two is marked, those on the organic media having grown two or three times as fast as the controls.

M. R. Henderson

Chonemorpha penangensis, a handsome white-flowered Malayan climber.

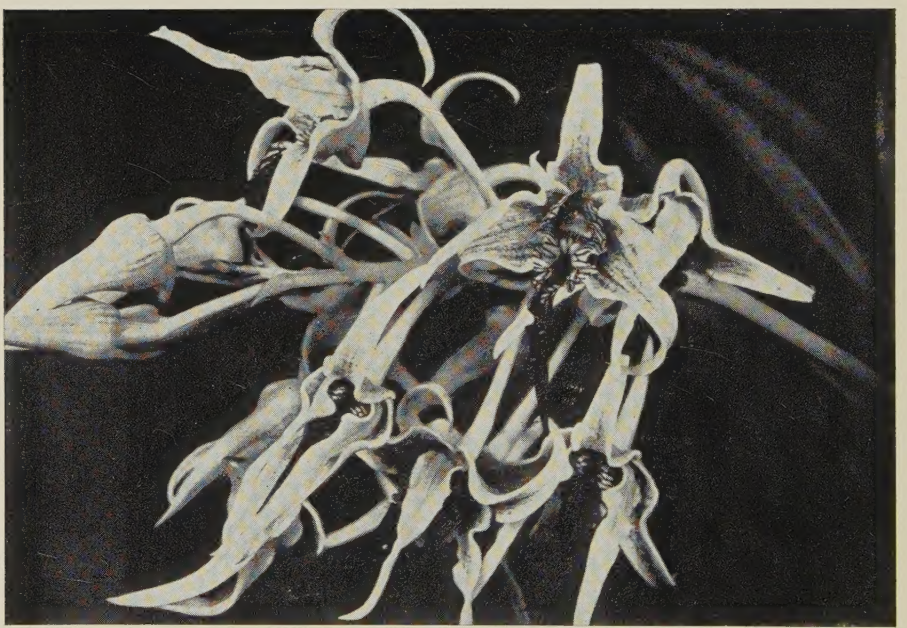
M. R. Henderson

Gustavia superba, a small tree from Tropical America with large white and pink flowers.



M. R. Henderson

Agrostophyllum bicuspidatum, a common Malayan orchid cultivated in the Botanic Gardens. The leaves are less than half an inch long.



M. R. Henderson

Dendrobium spectabile, a New Guinea orchid cultivated in the Botanic Gardens. The flowers are about 3 inches across.

M. R. Henderson

The Pergola on Lawn O. The large tree in the background is *Dyera costulata* or Jelutong.

M. R. Henderson

The Waterlilies in the Lake at 8 a.m.

M. R. Henderson

Part of the Frangipanni collection.

M. R. Henderson

Lodoicea seychellarum, the so-called Double Coco-nut, native only in the Seychelles. This plant is fourteen years old.

It was found that in flasks plugged with cotton wool which had been disinfected with picric acid and mercuric chloride, germination was poor and that seedlings transplanted into flasks so plugged tended to turn yellow. It seems possible that the mercuric chloride poisons the culture medium and although these plugs gave almost entire protection against fungus infection, their use has been abandoned.

Mr. Pestana carried out a series of experiments with small seedlings in pots to ascertain their reaction to feeding with artificial manures. The seedlings were between 1 cm. and 8 cm. tall, each set and its controls being uniform in size. They were given weekly application of a mixture supplying nitrogen, phosphorous and potassium, the controls receiving water only. In most cases there was a spectacular increase in height of the seedlings, this being the only dimension measured. The monopodial orchids, such as Vanda and Aranda naturally showed a larger increase than the sympodial ones such as Dendrobium, but inspection of the latter showed that there had been a considerable increase in overall size.

Experiments in a modified method of making beds for such orchids as Vanda, Aranda, etc. have been begun. The usual mixture of half rotted compost and cattle manure is very effective but it breaks down so rapidly that constant renewing and replanting of the beds is necessary. Beds have now been made substituting burnt earth, either newly made, or that discarded from pot plants, for the compost, and these promise well, for the mixture provides the open texture needed for the feeding roots of the orchids and preserves this texture for a much longer time than the compost.

The hybrid Vanda Tan Chay Yan, which was mentioned in last year's report, has fulfilled the promise given by the flowering of the first seedling. It is no exaggeration to say that it is the finest Vanda hybrid yet raised in Singapore and we venture to assert that it will hold its own with any Vanda hybrid from any part of the orchid world. All the seedlings seem to be hardy and free flowering and remarkably uniform in vegetative form and flower colour. They will grow vigorously in burnt earth beds.

New hybrids which flowered for the first time during the year are Dendrobium Gracia Lewis x D.Phalænopsis, which gives promise of being an excellent cross; Dendrobium Ursula x D.undulatum; Vandanthe Ellen Noa x Arachnis Maggie Oei; Vandopsis lissochiloides x Arachnis Maggie Oei; and Arachnis Hookeriana x Aerides odoratum.

A plant of a new Spathoglottis raised by Messrs. A. de Souza and W. de Silva was presented to the Gardens by the growers. It is a cross between Spathoglottis Primson and S.plicata and it is a vigorous plant with a large head of finely coloured flowers. Mr. Lee Kim Hong produced a new hybrid between Dendrobium Schulleri and D.Phalænopsis and gave a plant to the Gardens.

A number of crosses between free flowering Singapore hybrids and hybrids involving *Euanthe Sanderiana* have been made. *Euanthe Sanderiana* is a very fine Philippine orchid, closely related to Vanda. It does not grow well in Singapore and rarely flowers, but its hybrids, many of which have been made in Hawaii, take kindly as a rule to the Singapore climate. Such plants are obtained by exchange. It is hoped that in due course the alliance with Singapore hybrids will result in new and spectacular strains.

The hybrids between Arachnis and Vanda, known as Aranda, are nearly always sterile when selfed or crossed with other groups, which puts a stop

to attempts to breed improved Arandas. However, persistent trials have resulted in a few fertile crosses, of which seedlings are now in flasks. The genera involved are Aranda x Trichoglottis; Aranda x Vanda; Aranda x Vandanthe; Aranda x Renanthera; and Aranda x Arachnis.

Several boxes of cut orchids, contributed by a number of Singapore orchid growers, and by the Botanic Gardens, were sent to London by air for the Coronation. They arrived in perfect condition and were used in the decoration of the Queen's robing room at Westminster Abbey.

A smaller consignment of cut orchids from the Gardens was sent to the Royal Botanic Gardens, Kew, for exhibition at the Royal Horticultural Society's show in London.

VISITORS

A number of distinguished scientists visited the Gardens during the year. Amongst them were H.H. Tunku Yaacob, Member for Agriculture and Forestry, Federation of Malaya; Dr. and Mrs. Julian Huxley; Professor D. A. Webb, Professor of Botany in the University of Dublin; Dr. R. Melville, Royal Botanic Gardens, Kew; Professor B. Lindquist, Director of the Botanic Gardens, Gothenburg, Sweden; Mrs. Raymond Greene, botanist and artist from America; Mr. A. B. Walton, Conservator of Forests, North Borneo, and Mr. H. D. Ingle of C.S.I.R.O., Australia.

GOVERNMENT HOUSE DOMAIN

The grounds of the Domain were kept in good order throughout the year, partly due to the use of a new Dennis motor mower and an extra Allen motor scythe, which enabled most of the outlying parts of the Domain to come under close cultivation. Only small areas of undesirable thickets and rough growth remain to be dealt with.

All Canna beds were replanted twice during the year. The old Juniperus and Cypress trees alongside the 'in' and 'out' drives to Government House, which were long past their best, were removed and replaced by sixteen *Stenolobium stans*. A long section of the Hibiscus hedge bordering the 'out' drive, which had become old and untidy, was removed and replaced by a Cordia hedge, which in four months was full grown. Two very tall Royal palms by the path leading to the New Garden were taken out in accordance with the planting scheme for this area, begun two years ago. A large plant of *Bignonia magnifica* on the slope above the New Garden was replaced by eight Bougainvillea Singapore Beauty. A large bed of *Ixora javanica* was removed from the top of the slope above the guardroom and seven single beds of *Bougainvillea Poultoni* (a recent introduction to Singapore) and *Calliandra emarginata* put in its place. The Clove trees alongside the 'out' drive, which were beginning to lose their original compact shape, were heavily mulched with compost and the turf below them was renewed.

There has been a marked improvement in the growth of the orchid plants since their removal to the new nursery and an increased supply of cut orchids for Government House is now available.

Burnt earth for the large number of pot plants maintained was made about once a month. Sterameal was largely used as manure for these plants, with satisfactory results. Large quantities of compost were made, the chief constituent of it being spent hops, which were collected regularly from the local breweries.

The Domain competed in the 1953 Flower Show, exhibiting pot plants and cut flower arrangements and being awarded several prizes. Money prizes so gained are distributed to the gardeners who grew the plants or arranged the cut flower exhibits.

OUTSIDE WORK

The usual contact with the City Council Parks Department was maintained, with exchanges of plants.

Planting plans were drawn up for various building schemes and other public works, such as the Fort Canning Cemetery Park, the new Nurses Quarters at the General Hospital, etc. Welfare and charitable organizations were helped with advice and supply of plants. Many visits were paid to examine trees thought to be unsafe or in need of pruning; Mr. Addison paid a visit to Malacca to examine and report on roadside trees there, and was able to convince the authorities that several trees which they had thought dangerous could be preserved.

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